

Appn No. 10/040,405  
Amdt. Dated October 22, 1004  
Reply to Office Action of September 9, 2004

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### REMARKS/ARGUMENTS

The Applicant thanks the Examiner for the Office Action dated September 9, 2004.

### AMENDMENTS

In response to the Examiner's objections, claim 1 has been amended to specify that the first hollow cap is a one-piece molded cap. Basis for this amendment can be found at page 13, line 13 *et seq.* It is evident from this passage of the description, as well as Figures 23-28, that the presently claimed optical fiber terminator package comprises a one-piece molded cap.

The feature of "wherein the cap has been bonded to the semiconductor chip at the wafer stage prior to separation of the wafer into individual packages" has been deleted from claim 1.

The previous limitation of "the at least one region including at least one shaped recess forming a refractive lens for focusing electromagnetic radiation emitted or received by the at least one first optical device" has been removed from claim 1 and made the subject-matter of new claim 20.

Claim 4 has been made dependent on claim 2.

### CLAIM REJECTIONS - 35 USC § 103

The present application describes in detail a novel molding technique suitable for molding protective caps for various devices on semiconductor wafers (see page 6, line 22 *et seq.* of the present application). It is an important advantage of this novel molding technique that low-cost molded caps are produced having sufficient tolerances to avoid misalignments with the devices they are intended to protect. These caps are one-piece caps molded from single sheet of moldable material (*e.g.* thermoplastic), which can be fixed to a wafer and then spliced into individual packages.

By molding the caps in one step from a suitable mold, the number of manufacturing steps and, therefore, the cost of manufacturing the caps is reduced. Furthermore, as described on pages 13-15 of the description, similar molding techniques may be used to produce optically active protective caps. The resultant caps are one-piece molded caps advantageously having a transparent window suitable for coupling to optical fibers. None of the prior art describes one-piece molded caps suitable for coupling to optical fibers.

### Han et al (US 6,374,004)

Han shows in Figure 2A an optical subassembly in which an optics block 20 is spaced from opto-electronic devices 14 by a spacer 15. In combination, the optics block 20 and the spacer 15 effectively form a cap over the opto-electronics devices 14. However, this "cap" in Han is not a one-piece molded cap. It is quite clearly formed in two pieces: a spacer 15 and an optics block. Moreover, Han specifically states that the optics block is bonded to the spacer.

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In this regard, the Examiner is referred to the passage at column 5, lines 4-6, where it is stated:

*The optics block is then bonded into place, e.g. using solder or epoxy, on the spacer 15.*

Hence, in its most preferred embodiment Han teaches a two-piece bonded cap rather than a one-piece molded cap. This two-piece bonded cap of Han would not have the advantages of reduced manufacturing steps and reduced cost, which are important advantages of the present invention.

At column 5, lines 18-26 of Han, it is stated:

*While a spacer may be formed directly on the optics block itself, the use of a separate spacer 15 allows larger vertical separation to be achieved. The use of a separate spacer is particularly advantageous when providing optical elements on a bottom surface of the optics block 20, since the processes for forming the optics and the spacer features interfere with each other. Finally, use of a separate spacer allows the sealing off of the opto-electronic device 14 to be more readily and stably achieved.*

Whilst Han hints that the spacer "may be formed directly on the optics block", Han clearly prefers a separate spacer. In the Applicant's submission, this disclosure of Han does not amount to a teaching to the skilled person to use a one-piece molded cap, with the inherent advantages of such a cap described above.

The skilled person, having read Han and who wished to prepare a spacer formed directly on the optics block, would most likely envisage preparing an optics block by bonding a spacer thereto and then fixing this bonded combination to the substrate. From the overall teaching of Han, he would not be motivated to form a one-piece molded optics block. This is evident from the column 4, lines 13-14, where preferred materials for forming the optics block are described:

*For example, the optics block may be made of glass, which is preferable for forming optics therein.*

Glass is not a readily moldable material (at least not at practically achievable temperatures), and the skilled person would certainly not contemplate molding an appropriately shaped one-piece cap from glass. Molding such an optics block from glass would be dismissed immediately by the skilled person as impractical.

In summary, there is no teaching in Han that would motivate the skilled person to use one-piece molded caps for protecting opto-electronic devices. Accordingly, it is submitted that the present invention is not obvious in view of Han.

As regards the other cited prior art, it is further submitted that none of these cited documents teaches or suggests one-piece molded caps suitable for protecting opto-electronic devices. Accordingly, it is submitted that none of the other cited prior art affects the patentability of claim 1, either alone or in combination with Han.

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It is respectfully submitted that all of the Examiner's objections have been successfully traversed. Accordingly, it is submitted that the application is now in condition for allowance. Reconsideration and allowance of the application is courteously solicited.

Very respectfully,

Applicant:



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